

# Wildlife-Vehicle Collision Data Analysis

Scientists have estimated that highway accidents kill between 500,000 and 700,000 deer in the United States every year.<sup>1</sup> These accidents can also result in injuries or death to humans as well as extensive property damage.

Many people believe that wildlife-vehicle collisions are a significant problem and millions of dollars should be invested to make roads safer for the humans that drive them and the animals that cross them. Other people disagree. Although they admit that accidents involving wildlife do occur, they believe that the problem is minor and our money is better spent elsewhere. You must take a careful look at the facts and come to your own conclusion.

Often in science, there is too much information for one person to analyze independently. As a result, scientists often work in teams. For this activity, your teacher will divide the class into six teams and provide each team with a piece of the data relevant to this problem. Each team must then analyze their data, prepare a graph and then present it to the class so that everyone becomes familiar with all the issues. To help your team be successful, each member will have to become an expert.

## Group 1: Arizona Population

Use the table below to complete the tasks and answer the questions.

*Table 1: Total Population of Arizona (in millions)*

Year	1997	1998	1999	2000	2001	2002	2003
Population	4.6	4.8	4.9	5.1	5.3	5.5	5.6

*Source: Arizona Department of Transportation*

### Tasks:

1. Use the data in the table above to make a line graph. Feel free to use large paper and markers to ensure that everyone will be able to see it.
2. Write a brief paragraph explaining what the graph shows. This will be the main information that your team will present to the class.
3. Answer the following questions:
  - a. What is the total change in population over this time period?
  - b. What is the average change in population per year?
  - c. If this trend were to continue, what do you expect the population of Arizona to be in 2010? 2050?
4. Write a brief paragraph explaining what the graph shows. This will be the main information that your team will present to the class. Present your graph and your analysis to the class.
5. When all groups have presented, write a short essay (1-2 pages) in which you summarize the major facts and statistics, state whether or not the citizens of Arizona should be concerned about wildlife-vehicle collisions, and explain what action, if any, the Arizona government should take.



<sup>1</sup> Romin, L. A. and J. A. Bissonette. 1996. *Deer-vehicle collisions: status of state monitoring activities and mitigation efforts*. Wildlife Society Bulletin 24:276-283.

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## **Group 2: Statewide Wildlife-Vehicle Collisions**

Use the table below to complete the tasks and answer the questions.

*Table 2: Total Number of Vehicle Collisions Involving Wildlife in Arizona*

Year	1997	1998	1999	2000	2001	2002	2003
# of Crashes	1285	1136	1480	1671	1638	1791	1414

*Source: Arizona Department of Transportation*

### Tasks:

1. Use the data in the table above to make a bar graph. Feel free to use large paper and markers to ensure that everyone will be able to see it.
2. Write a brief paragraph explaining what the graph shows. This will be the main information that your team will present to the class.
3. Answer the following questions:
  - a. Which year had the most collisions involving wildlife? The least?
  - b. What is the average number of collisions per year?
  - c. Does the number of collisions appear to be increasing, decreasing, or staying the same?
  - d. If this trend were to continue, what would you expect the number of similar collisions to be in 2010?
4. Present your graph and your analysis to the class.
5. When all groups have presented, write a short essay (1-2 pages) in which you summarize the major facts and statistics, state whether or not the citizens of Arizona should be concerned about wildlife-vehicle collisions, and explain what action, if any, the Arizona government should take.



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## **Group 3: Injuries Resulting from Collisions**

Use the table below to complete the tasks and answer the questions.

***Table 3: Total Reported Injuries and Deaths from Vehicle Collisions Involving Wildlife in Arizona***

Year	1997	1998	1999	2000	2001	2002	2003
Injuries	248	206	260	280	344	314	244
Deaths	2	7	2	2	1	3	5

*Source: Arizona Department of Transportation*

### Tasks:

1. Use the data in the table above to make a bar graph. Feel free to use large paper and markers to insure that everyone will be able to see it.
2. Write a brief paragraph explaining what the graph shows. This will be the main information that your team will present to the class.
3. Answer the following questions:
  - a. What is the total number of people injured over this time period? Killed?
  - b. What is the average number of people injured/killed per year?
  - c. Does the number of injuries/deaths appear to be increasing, decreasing, or staying the same? If this trend were to continue, what would you expect the number of injuries/deaths to be in 2010?
4. Present your graph and your analysis to the class.
5. When all groups have presented, write a short essay (1-2 pages) in which you summarize the major facts and statistics, state whether or not the citizens of Arizona should be concerned about wildlife-vehicle collisions, and explain what action, if any, the Arizona government should take.



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## **Group 4: Elk Population Near State Route 260**

Use the table below to complete the tasks and answer the questions.

***Table 4: Estimated Number of Elk in the Vicinity of State Route 260***

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
# of Elk	1683	1678	1665	1672	1660	1710	1542	1716	1587	1488

*Source: Arizona Game and Fish Department*

### Tasks:

1. Use the data in the table above to make a line graph. Feel free to use large paper and markers to ensure that everyone will be able to see it.
2. Write a brief paragraph explaining what the graph shows. This will be the main information that your team will present to the class.
3. Answer the following questions:
  - a. Which year had the most elk? The least?
  - b. What is the average number of elk per year?
  - c. Does the population of elk appear to be increasing, decreasing, or staying the same?
  - d. If this trend were to continue, what would you expect the number of elk to be in 2010?
4. Present your graph and your analysis to the class.
5. When all groups have presented, write a short essay (1-2 pages) in which you summarize the major facts and statistics, state whether or not the citizens of Arizona should be concerned about wildlife-vehicle collisions, and explain what action, if any, the Arizona government should take.



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## **Group 5: Elk Killed on State Route 260**

Use the table below to complete the tasks and answer the questions.

**Table 5: Elk Killed by Vehicle Collisions on State Route 260**

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
# of Elk Killed	20	25	23	27	33	39	14	29	36	34	42

*Source: Arizona Game and Fish Department and Arizona Department of Transportation*

### Tasks:

1. Use the data in the table above to make a bar graph. Feel free to use large paper and markers to ensure that everyone will be able to see it.
2. Write a brief paragraph explaining what the graph shows. This will be the main information that your team will present to the class.
3. Answer the following questions:
  - a. In which year were the most elk killed? The least?
  - b. What is the average number of elk killed per year?
  - c. Does the number of elk killed by vehicles appear to be increasing, decreasing, or staying the same? If this trend were to continue, what would you expect the number of (or: collisions resulting in elk deaths) to be in 2010?
4. Present your graph and your analysis to the class.
5. When all groups have presented, write a short essay (1-2 pages) in which you summarize the major facts and statistics, state whether or not the citizens of Arizona should be concerned about wildlife-vehicle collisions, and explain what action, if any, the Arizona government should take.



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## Group 6: Average Daily Traffic on State Route 260

Use the table below to complete the tasks and answer the questions.

**Table 6: Average Annual Daily Traffic Volume (AADT) on State Route 260**

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
AADT	3124	3123	3652	3750	3950	4930	5112	4500	6267	8700

*Source: Arizona Game and Fish Department and Arizona Department of Transportation*

### Tasks:

1. Use the data in the table above to make a line graph. Feel free to use large paper and markers to ensure that everyone will be able to see it.
2. Write a brief paragraph explaining what the graph shows. This will be the main information that your team will present to the class.
3. Answer the following questions:
  - a. How much has the average daily traffic increased during this time period?
  - b. What is the average increase in traffic per year?
  - c. If this trend were to continue, what would you expect the average daily traffic to be in 2010? 2050?
4. Present your graph and your analysis to the class.
5. When all groups have presented, write a short essay (1-2 pages) in which you summarize the major facts and statistics, state whether or not the citizens of Arizona should be concerned about wildlife-vehicle collisions, and explain what action, if any, the Arizona government should take.

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## ***Is There a Problem? Rubric***

The following rubric will show you how your essay will be evaluated. Use it as you write.

<b>CATEGORY</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
Accuracy of Facts (Content)	All supportive facts are reported accurately.	Almost all supportive facts are reported accurately.	Most supportive facts are reported accurately.	NO facts are reported OR most are inaccurately reported.
Adding Personality (Voice)	The writer has developed a unique and persuasive voice. There is a strong sense of personality.	The writer has developed a convincing voice. There is some sense of personality, but it may be inconsistent or weak at times.	The writer occasionally develops a convincing voice, but generally it is weak and inconsistent.	There is no sense of voice in the essay.
Sequencing (Organization)	Details are placed in a logical order, and the way they are presented effectively keeps the interest of the reader.	Details are placed in a logical order, but the way in which they are presented/ introduced sometimes makes the writing less interesting.	Some details are not in a logical or expected order and may distract or confuse the reader.	Many details are not in a logical or expected order. There is little sense that the writing is organized.
Word Choice	Writer uses vivid words and phrases that linger or draw pictures in the reader's mind, and the choice and placement of the words seems accurate, natural and not forced.	Writer uses vivid words and phrases that linger or draw pictures in the reader's mind, but occasionally the words are used inaccurately or seem overdone.	Writer uses words that communicate clearly, but the writing lacks variety, punch or flair.	Writer uses a limited vocabulary that does not communicate strongly or capture the reader's interest. Jargon or clichés may be present and detract from the meaning.
Flow and Rhythm (Sentence Fluency)	All sentences sound natural and are easy-on-the-ear when read aloud. Each sentence is clear and has an obvious emphasis.	Almost all sentences sound natural and are easy-on-the-ear when read aloud, but one or two are stiff, awkward or difficult to understand.	Most sentences sound natural and are easy-on-the-ear when read aloud, but several are stiff, awkward or difficult to understand.	The sentences are difficult to read aloud because they sound awkward, are repetitive, or difficult to understand.

